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## INSPECTION PROCEDURE IP 88200 APPENDIX F

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### INSPECTION OF MECHANICAL COMPONENTS AT FUEL CYCLE FACILITIES

Effective Date: May 28, 2025

#### 88200.F-01 INSPECTION OBJECTIVES

- 01.01 To determine if safety-significant mechanical component work is being performed in accordance with regulatory requirements, the licensing basis, specifications, drawings, and work procedures.
- 01.02 To determine if the applicant/licensee's system for preparing, reviewing, and maintaining records relative to safety-significant mechanical component activities reflect work accomplishment consistent with specifications and procedures.
- 01.03 To determine if the as-built condition of safety-significant mechanical components meets the specified design requirements, specifications, and drawings.
- 01.04 To determine if the implementation of the management measures related to work activities for safety-significant mechanical components associated with items relied-on for safety (IROFS) is effective and to verify that deviations from requirements are appropriately resolved.

#### 88200.F-02 INSPECTION REQUIREMENTS

- 02.01 For the safety-significant items and services (SSIS) selected for inspection of mechanical components, determine whether procedures exist in the following areas, are compatible with the management measures program for IROFS, and prescribe adequate methods to meet the licensing basis and construction specifications, where applicable:
  - a. receipt inspection
  - b. storage, handling, and protection
  - c. installation
  - d. protection and maintenance after installation
  - e. Configuration management
- 02.02 Determine whether the applicant/licensee has an established audit program (including plans, procedures, and audit schedule) for assessing the adequacy of work control functions and requirements, as applicable in their licensing basis, in the area of mechanical component activities, and for ensuring that examination, inspection, and if required, test personnel associated with performing tests and inspections of safety-significant activities are qualified and/or certified to perform their assigned work.
- 02.03 Ascertain whether the following safety-significant mechanical component activities, as required by licensing commitments and applicable construction codes, are being

controlled and accomplished in accordance with documents reviewed in Inspection Requirement 02.01, above:

- a. as-built activities
- b. receipt inspection
- c. storage, handling, and protection
- d. installation
- e. protection and maintenance after installation
- f. configuration management

02.04 Review the documentation generated for the safety-significant mechanical component construction activities, as required by the licensing basis. Determine whether the applicant/licensee/contractor system for documenting safety-significant work is functioning in accordance with requirements. Records should be complete, reviewed by quality control, engineering personnel, or designee, as required, and readily retrievable.

- a. receipt inspection and material certification
- b. installation inspection
- c. nonconformance/deviation record(s)
- d. training/qualification records of craft, and quality inspection personnel (as required)
- e. configuration management records

## 88200.F-03 INSPECTION GUIDANCE

### General Guidance

Inspectors should review the facility description in the integrated safety analysis, integrated safety analysis summary, or equivalent and be familiar with the SSIS being constructed at the site. The purpose of these as-built inspections is to verify that the assumptions and critical attributes reviewed during the licensing review process remain valid; the design was appropriately translated to construction specifications; the licensee/applicant constructed the facility in accordance with these specifications; and any modifications performed comply with the licensee's configuration management program and does not impact any NRC licensing decisions.

Inspectors should also be familiar with the licensee's management measures and/or quality assurance program, if applicable, and the licensing basis associated with these measures. It is not the objective of this inspection procedure (IP) to verify the adequacy of the applicant/licensee's management measures program, but inspectors should be prepared to identify potential gaps in the implementation of management measures for future inspections. Inspectors should complete this appendix by inspecting the attributes listed in this appendix for as-built mechanical component work with a focus on SSIS, such as IROFS, or regulatory requirements, as applicable.

Inspectors should contact the applicant/licensee prior to the onsite inspection to help determine what samples are to be inspected. Observation during in-progress activities, like construction, installation, and testing, is desirable but not required. If necessary, inspectors may select completed components/systems for inspection. Inspectors should not attempt to inspect all available samples but may expand if significant concerns with the applicant/licensee's control of installation/construction arise in this functional area.

Inspectors should collect applicant/licensee procedures, specifications, and work completion records in advance. If unable to review these documents in advance of the onsite inspection, then the licensee should be notified that these documents, and any other relevant documents, should be available when the inspector(s) arrives at the site.

Inspectors should choose one or more safety-significant mechanical components and review the areas listed in Inspection Requirements 02.01 through 02.04 to the extent practical and may use their judgment in determining which areas to concentrate on if time is limited.

#### 03.01 Inspection Requirement 02.01

- a. Review construction specifications related to safety-significant mechanical components and ascertain whether the specified technical requirements conform to the commitments contained in the licensing basis.
- b. Review mechanical component procedures and as applicable, verify they specify provisions for adequate onsite engineering direction, are appropriate and adequate related to procurement and use of materials, specify adequate control of hold points, and provide adequate controls for design changes and incorporation of design changes into as-built drawings.
- c. Determine if appropriate and adequate procedures in the following areas are compatible with the management measures program, and prescribe adequate methods to meet the construction specifications, where applicable:
  1. receipt inspection
  2. storage, handling, and protection
  3. installation
  4. protection and maintenance after installation
  5. configuration management
- d. For the procedure review, consider the following attributes:
  1. Procurement documents incorporate the technical and quality requirements in the material requisition. This includes identification of material specifications and, if required, performance test requirements.
  2. Receipt inspections are adequate and capable of detecting damage or out-of-specification conditions, including adequacy of performance testing, etc. Also, provisions are in place to prevent nonconforming equipment and materials from being installed and used.
  3. Post-inspection cleaning, preservation, and inspection requirements have been established before needed.
  4. For IROFS, determine if procedures are compatible with the management measures program, and prescribe adequate methods to meet the construction specifications.

#### 03.02 Inspection Requirement 02.02

- a. Review applicant/licensee's established audit program (including plans, procedures, and audit schedule) for assessing the adequacy of work control functions and requirements,

as applicable, in their licensing basis, in the area of safety-significant mechanical components construction activities.

- b. Review audit program to verify if examinations and inspections are performed in accordance with applicant/licensee's requirements and if test personnel associated with performing tests and inspections of safety-significant mechanical components construction activities are qualified and/or certified to perform their assigned work.
- c. Verify records establish that required audits, as applicable, were performed and that deficiencies identified during audits were tracked and corrected.

### 03.03 Inspection Requirement 02.03

- a. Select representative safety-significant mechanical components to inspect. The sample may contain materials handling, fluid transport, or fluid systems components (including, process vessels, tanks, and enclosures). Observe work performance, partially completed work, and/or completed work on these components, as appropriate. Review the pertinent quality-related records for the components selected, or a similar selection of components if more appropriate.
- b. Ascertain whether the following activities, as required by licensing commitments and applicable construction codes, are being controlled and accomplished in accordance with the requirements of the documents reviewed in 02.01, above:

#### 1. As-Built Activities

- (a) The inspectors should verify that the licensee has established measures for identification and control of materials, parts, and components, and for traceability, to the approved design basis and to the source.
- (b) The inspectors should ensure that required identification of the item is maintained by heat number, part number, serial number or other appropriate means, either on the item or on records traceable to the item, as required, and that required markings are on the item.
- (c) The inspectors should note markings on material and equipment and verify that the markings represent material and equipment as specified by the design drawings and specifications. In the case of fasteners, compliance with the applicable material specification should be verified by required markings on bolts and nuts and certified material test reports or certificates of conformance, as required by the applicable procurement drawings and specifications, and/or by the applicable codes and specifications.
- (d) In the case of vendor-supplied equipment assemblies containing fasteners, samples should be inspected to verify compliance with approved vendor drawings and specifications and other information, such as materials used for equipment-qualification tests and/or analyses, as applicable. Caution should be exercised to ensure that the required markings on material and equipment, including fasteners, not only exist, but that the markings indicate the correct material and grade, as specified.

2. Receipt Inspections. Adherence to receipt IPs, including provisions for ensuring:
  - (a) piping supports and restraints materials are in conformance with purchase specifications, including special requirements,
  - (b) marking, identification, and storage level classifications,
  - (c) as received cleanliness and protection,
  - (d) receipt inspection reports are generated as required, and
  - (e) disposition of nonconforming items.
3. Storage, Handling, and Protection
  - (a) Material-storage procedures should include the requirements that components be identified; properly segregated by type; provided protection from physical or contamination damage, during handling and storage; and that controls for component withdrawal are provided, to ensure proper issuance.
  - (b) Storage environment and protection of components (protective covers, caps, preservatives, desiccants, heaters, inert gas blankets, etc.) are in accordance with manufacturer's instructions and/or established procedures.
  - (c) Implementation of special storage and maintenance requirements such as rotation of motors, pumps, lubrication, insulation testing (electrical), cleanliness, etc.
  - (d) Performance of licensee/contractor surveillance activities and documentation thereof are being accomplished at required frequency.
4. Installation Activities
  - (a) Installation requirements such as proper location, placement, orientation, alignment, mounting (torquing of bolts and expansion anchors), flow direction, tolerances, and expansion clearance are met.
  - (b) Precautions to prevent damage during placement/mounting are adhered to, where appropriate.
  - (c) Availability and usage of specially trained personnel and equipment where required to meet component manufacturer's instructions.
  - (d) Torque switches, limit switches, and bypass switches on valves have been properly installed, adjusted and checked out, in accordance with established instructions and procedures. Integrated system checks could be a potential focus of inspection.
  - (e) Appropriate drawings and work procedures are available to installers. Installation requirements, construction drawings, specifications, and work procedures are technically adequate and of the latest approved issue.
  - (f) Hold points are observed, when required.

(g) Design changes relevant to the work being observed have been appropriately processed through required review and approval routes.

(h) Preparation and maintenance of installation and inspection records are adequate.

5. Protection and Maintenance after Installation

(a) Inspection activities, including scope and frequency, are being performed according to instructions.

(b) Protection provided as required, including protection against adverse temperature, humidity, flooding, and foreign materials, such as dirt, dust, bottles, cans, and general debris.

(c) Lubrication, rotation, and electrical resistance checks are being performed, as required.

(d) Records are being maintained on the status of installed components.

(e) Appropriate stamps, tags, markings, etc., are in use to prevent oversight of required inspections, completion of tests, acceptance, and the prevention of inadvertent operation.

6. Configuration management. For the activities observed during Inspection Requirement 02.03, verify if changes occurred during these construction activities, the applicant/licensee properly controlled and documented these changes for engineering review, approval, and subsequent incorporation into the final as-built drawings, as applicable. Verify these actions were completed in accordance with their procedures and management measures.

03.04 Inspection Requirement 02.04

Ascertain whether for the safety-significant mechanical component construction activities, the applicant/licensee/contractor system for documenting safety-significant work is functioning in accordance with requirements.

a. Receipt Inspection and Material Certification. Select records applicable to the receipt of lots or shipments. Select records applicable to the storage, and storage inspection of lots or groups of mechanical component and associated items.

1. Records confirm that required material characteristics, performance tests, nondestructive tests, environmental qualification tests, and other specification requirements are met, as required.

2. Receipt inspection and storage records indicate that, where appropriate, defective or incorrect components, parts, and materials are controlled and prevented from installation and possible use.

3. Documentation has been prepared and maintained as required by receipt inspection and documentation storage instructions.

b. Installation Inspection

1. Records confirm that specified materials and components were installed as specified and that the required construction inspections were performed, and acceptance criteria are defined.
2. Review licensee and contractor requirements covering the span of records for mechanical components. Determine the initiation point for those records sampled and, importantly, the effectiveness of those responsible for reviewing the records for accuracy and completeness and ensuring that the recorded information meets documentation requirements. To determine the effectiveness of the licensee or contractor system for documenting work in this area, verify that:
  - (a) Type and classification of mechanical component comply with appropriate drawings and specifications.
  - (b) Location, spacing, and critical clearances meet licensee's specifications and have been verified by construction quality control inspections.
  - (c) The required scope of licensee construction quality control inspections was met.
  - (d) If welded, then weld identification/location corresponds to respective weld card, drawing, work order, or other welding documentation.
  - (e) Welding material used corresponds to the material specified.
  - (f) Welders were qualified to the welding procedures used and welding procedures were qualified in accordance with licensing basis and building code requirements.
  - (g) The records confirm that for welding activities where attachments are welded directly to piping, the welding specifications used are the same or equivalent to the ones used for pipe welding, including preheat, post weld heat treatment, and nondestructive examinations.
3. Review and evaluate pertinent quality records in a sampling of the areas listed below. Determine whether:
  - (a) adequate preparation, control, review, and evaluation of these records have been made
  - (b) records reflect that appropriate requirements have been met
  - (c) the system of records is functioning properly

c. Nonconformance/Deviation Record

1. Records include current status of these items. Nonconformance reports include the status of corrective action or resolution (e.g., determine whether adequate corrective action is being taken when test results are not within tolerance or acceptance criteria).
2. For the inspection, review and evaluate a sampling of reports applicable to nonconformances or deviations. Determine whether:

- (a) Records are complete and promptly reviewed by qualified personnel.
- (b) Records have been routinely processed, evaluated in a timely manner and controlled through established channels, for resolution of the root-cause as well as the immediate problem.
- (c) Records are properly identified and stored, indicate current status, and can be retrieved in a reasonable time.
- (d) Nonconformance reports include the status of corrective action or resolution, and adequate justification is provided for use-as-is disposition.
- d. Training/Qualification Records of Craft, and Quality Inspection Personnel. Records establish that quality inspection personnel, as applicable, are adequately qualified for their assigned duties and responsibilities and that craft personnel have been trained in their assigned tasks. Records are complete and current and show which activities inspectors are qualified to perform.
- e. Configuration Management Records. Review and evaluate a selected sample of configuration management records, and determine whether:
  - 1. Records associated with design and field changes, as well as related work and IP changes, reflect that timely review and evaluation of design and field change documents have been performed by personnel who are qualified.
  - 2. Records of periodic inspections ensure that only the most recent approved documents, including design changes, were used in the field.
  - 3. Design changes are subject to adequate design control, including consideration of the impact of the change on the overall design and on as-built records.
  - 4. Records of nonconformances to design requirements include preparation of a nonconformance report even if the nonconformance is resolved through the design-change process.

### 03.05 Additional Guidance

Note: Personnel Interviews. Informal interviews with field-craft and inspection personnel may be randomly conducted to determine how well employees know the requirements of their work activity. Ascertain whether a sufficient number of adequately qualified quality control inspection personnel, if required, are at the construction site, commensurate with the work in progress, and adequately performing their assigned duties through the established organizational structure.

Prevalent Errors and Concerns. Areas in which the inspector should be alert to potential generic issues. This section is included to provide background for inspectors on past mechanical component issues related to construction experience at previous projects. (Note: These are not listed in order of their perceived importance to safety.) These areas include:

- a. Documentation not kept current.



- b. Inspection documentation signed off by persons other than the inspectors actually responsible for the recorded information.
- c. Nonconformance report system deficient in that reports could be destroyed, filed away, or otherwise signed off, without proper resolution or accountability of action taken.
- d. Weather protection degradation due to inattention to damage and normal “wear and tear,” leading to substandard or unacceptable protection provisions.
- e. Improper installation and adjustment of motor-operated valve torque switches, limit switches, and bypass switches. Applicable specifications and instructions have not been adequate to ensure proper installation, adjustment, and check-out.
- f. Inspection procedures, instructions, and acceptance criteria lack clarity, and in some cases are difficult to find and use.
- g. Licensee audit reports containing adverse findings and recommendations without appropriate follow-up and resolution.

#### 88200.F-04 RESOURCE ESTIMATE

This appendix is intended to provide inspection requirements and guidance applicable to a wide variety of potential construction projects at both existing and new fuel cycle facilities (FCFs). These projects may vary greatly in scope, complexity, and potential risk to public health and safety. Recommended inspection scope and hours for a specific new FCF will be documented in the principal inspection plan (PIP) for that facility developed in accordance with Inspection Manual Chapter (IMC) 2694, “Fuel Cycle Facility Construction and Pre-Operational Readiness Review Inspection Program.”

Additionally, this IP can be used to provide additional inspection guidance for plant modification inspections at existing facilities but is not required to be implemented for these projects. Use of this appendix, or sections of this appendix, for modifications at existing FCFs, would be done on a case-by-case basis, in accordance with IMC 2600, Appendix B, “NRC Core Inspection Requirements.”

#### 88200.F-05 PROCEDURE COMPLETION

This inspection procedure is complete when the applicable appendices or applicable appendix sections are completed for the facility, as determined by the PIP. Inspectors are not expected to complete every activity in the appendices of this IP. Instead, inspectors should prioritize inspection activities based on 1) importance of the activity to safety, 2) availability of the onsite activity at the time of the inspection, and 3) available inspection resources. This appendix does not need to be completed if there are no SSIS covered by this appendix at a FCF.

#### 88200.F-06 REFERENCES

Refer to licensing basis requirements for applicable codes and standards for each fuel facility.

END

List of Attachments:

1. Revision History Table

Attachment 1: Revision History for IP 88200 Appendix F

Commitment Tracking Number	Accession Number Issue Date Change Notice	Description of Change	Description of Training Required and Completion Date	Comment Resolution and Closed Feedback Form Accession Number (Pre-Decisional Non-Public Information)
	ML24215A337 05/28/25 CN 25-014	Initial issuance. Discipline-specific appendix developed to provide technical inspection guidance for new construction and major modifications activities for fuel facilities with varying technologies, size, licensing requirements, etc.	N/A	N/A